

**EFFECTIVENESS OF HOT PEPPER (*Capsicum annuum*)  
EXTRACT AS ALTERNATIVE DISINFECTANT  
IN DENTAL CUSPIDORS**

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by

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## **ABSTRACT**

**Title: EFFECTIVENESS OF HOT PEPPER (*Capsicum annuum*) EXTRACT AS  
AN ALTERNATIVE DISINFECTANT FOR THE DENTAL CUSPIDORS**

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### **Introduction**

Hot pepper (*Capsicum annuum*) contains a pungent compound known as capsaicin. It greatly attributes to the antimicrobial property of *Capsicum annuum*. Capsaicin is a phenol compound, which is the major component of disinfectants. **Statement of the Problem**

This study sought to determine the effectiveness of hot pepper (*Capsicum annuum*) extract as alternative disinfectant for cuspidor.

Specifically this aimed to answer the following questions:

1. What is the result of hot pepper extract for solubility test?
2. What are the significant differences between the different hot pepper extract concentration levels, in terms of zone of inhibition?
3. In which group of target microorganism is hot pepper (*Capsicum annuum*) extract more effective as disinfectant?
4. How does the hot pepper (*Capsicum annuum*) extract as a disinfectant compare with commercially available disinfectant?

## **Methodology**

The experimental type of research was used in this study. Also statistical treatment through the use of T-test was utilized for comparison of the effectiveness of red pepper disinfectant with different concentration levels as well as to the commercially available one.

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## CHAPTER 1

### The Problem and Its Background

#### Introduction

It is always the dental practitioner's duty to provide a protected and sterile environment during dental treatment. A filthy environment has a high possibility for the growth of pathogenic microorganism that may cause infection both to the patient and the dentist. Patients are also to be considered as carriers of infectious diseases through their secretions, such as saliva and blood. To prevent the spread of diseases, disinfection should always be practiced.

Disinfection was first introduced by John Lister who introduced "carbolic acid", a phenol, as the first disinfectant. Disinfectants are substances that are applied to non-living subjects to reduce microorganisms.<sup>1</sup> Nowadays, disinfectants are widely used in health care, food and pharmaceutical sectors to prevent unwanted pathogens from causing diseases. In the field of dentistry, both the dental practitioner and the patient are highly susceptible in acquiring infectious diseases. Thus, the prime concept of disinfection focuses on their protection. Consequently, dental personnel must be thorough in the control of infection by maintaining a clean and sterile place. This will avoid contamination and transfer of diseases.

In the Philippines, there is an abundance of plants that may possess components that are able to fight microorganisms. One of which is hot pepper, *Capsicum annuum*. *Capsicum annuum* is a member of the Solanaceae family. It is a very popular additive in cooking. Most commonly known for giving culinary dishes its fiery flavor.<sup>2</sup> Aside from its common uses, hot pepper has also some herbal uses. It increases blood flow, induces sweating, reduces muscle tension and spasms and relieves gas and colic. Recent studies also suggests its antiseptic and rubefacient properties.<sup>3</sup>

*Capsicum annuum*, commonly known as cayenne pepper or hot pepper contains capsaicinoids, fatty acids, flavonoids, volatile oil and carotene pigment. It contains over 100 volatile compounds. The capsaicinoids are principally responsible for the biological activity of the hot pepper.<sup>4</sup> The major component of capsaicinoid is a pungent compound known as capsaicin. This compound greatly attributes to the antimicrobial property of the *Capsicum* species.<sup>5</sup>

According to S. Soetarno, et. al, three varieties of *Capsicum* showed similar potencies against Gram(+) and Gram(-) bacteria and fungi. Bioautographic tests demonstrated that capsaicin was the main antimicrobial component. The results suggest that all kinds of *Capsicum* fruits tested are useful as antibacterial and anticandidal agents.<sup>6</sup>

Another research by R.C. Cichewiez, et. al revealed that tissues of *Capsicum* species are included in a number of herbal remedies for a variety of ailments of probable microbial origin. They stated that two pungent compounds found in *Capsicum* species (capsaicin and dihydrocapsaicin) were positive of antimicrobial property.<sup>7</sup>

### **Background of the Study**

Hot Pepper (*Capsicum annuum*) is an annual pepper of the nightshade (Solanaceae) family.<sup>8</sup> It was commonly used in both food and medicinal products. The main content that is responsible to the biologic activity of capsicum is capsaicinoids which has an antimicrobial property.<sup>9</sup>

Disinfectants are the chemical substances used to destruct germs and microorganisms such as bacteria and fungi and, it is use also in cleansing infection. The criteria for an ideal disinfectant should be fast acting, broad spectrum, non-corrosive, non-toxic, surface compatible, easy to use, inexpensive and odorless.<sup>10</sup> Disinfectants that will fulfill the following criteria may produce high and intermediate level of biocidal activity, yet the commercially available ones doesn't necessarily meet the standards. Based on the

given statement, the researcher is eager to make an alternative disinfectant out from hot pepper that will have all the criteria of an ideal disinfectant. The researcher came up about this study through his experiences in the dental infirmary in which disinfection is a standard operating procedure. This experiment will show the effectiveness of hot pepper (*Capsicum annuum*) extract as an alternative disinfectant for cuspidor.

### **Statement of the Problem**

This study aimed to determine the effectiveness of hot pepper (*Capsicum annuum*) extract as alternative disinfectant for cuspidor.

Specifically this aimed to answer the following questions:

5. What is the result of hot pepper extract for solubility test?
6. How does the hot pepper (*Capsicum annuum*) extract as a disinfectant compare with commercially available disinfectant?
7. In which group of target microorganism is hot pepper (*Capsicum annuum*) extract more effective as disinfectant?
8. Are their significant differences between the different hot pepper extract concentration levels, in terms of zone of inhibition?

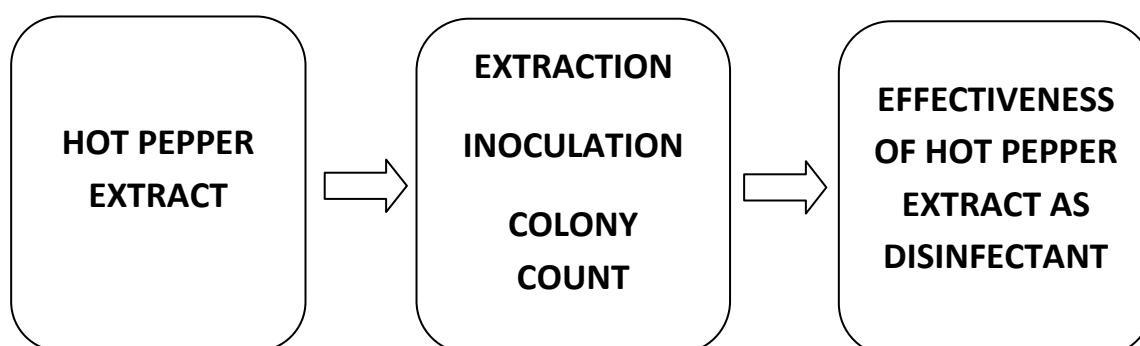
### **Hypothesis**

There is no significant difference on the effectiveness of hot pepper (*Capsicum annuum*) extract as an alternative disinfectant against bacteria and fungi for cuspidor.

### **Conceptual Framework**

The concept of the study was to collect extract from hot pepper (*Capsicum annuum*) used in preparing disinfectant with different concentration levels. Swabbing of samples from the cuspidor was done in the Endo-Perio Section. The samples collected were brought to the laboratory for culturing. Collected extract and cultured samples were used in performing the zone of inhibition using pour plate method. The results from the laboratory regarding the

zone of inhibition determined the effectiveness of hot pepper (*Capsicum annuum*) extract as an alternative disinfectant.



**Figure 1. A Paradigm of Hot Pepper (*Capsicum annuum*) Extract as Disinfectant**

### **Setting of the Study**

The study was conducted at the School of Dentistry, Centro Escolar University in San Rafael Street, Mendiola, Manila.

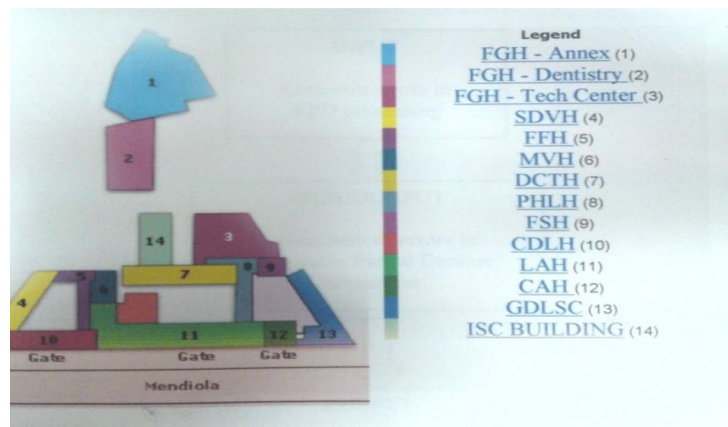
Centro Escolar University is a private, nonsectarian higher education institution for the instruction and training of the youth in all branches of the arts and sciences. It is originally called Centro Escolar de Senoritas and was established on June 3, 1907 by Doña Librada Avelino and Doña Carmen de Luna as a nationalistic center of learning for Filipino women. It is best known for its programs in the health sciences, especially dentistry and also for its undergraduate and graduate programs.

The School of Dentistry was established in 1925. The school is recognized in producing **competent and competitive dental professionals**. The Dentistry program is managed by experienced dental professionals. Students are trained theoretically and practically.

The College of Dentistry has a state-of-the-art dental infirmary with 320 dental units and chairs. The dental infirmary is divided into Oral Diagnosis, Oral surgery, Ortho-Pedo, Endo-Perio, Restorative Dentistry and Prosthodontics Section. There are also porcelain

laboratory facilities, x-ray units that offer cephalometrics, panoramic and periapical radiographs, dentoform models, dental simulator room first of its kind in the country.

The researcher gathered samples from the cuspidors at the Endo-Perio Section located at the 2<sup>nd</sup> Floor, Fernando Guerrero Hall. The researcher prepared and tested the hot pepper disinfectant at the research laboratory located at the GDLSC hall.



**Figure 2. Map of Centro Escolar University**



**Figure 3. Centro Escolar University Sitemap**

## **Significance of the Studies**

Infection control is a prime importance in the practice of dentistry. It is essential to the safety of the dentists, patients and community. One method of infection control is disinfection. Disinfection is a protocol for any dental procedures for this aids in the

prevention of the spread of infectious diseases. The researcher intends to promote disinfection; thus, the need to conduct this study.

This study will benefit the dental professionals in the practice of infection control. It is a professional responsibility of the dentist to prevent transmission of infection. This will also help protect the dental professionals from acquiring infectious diseases carried by their patients. This will provide dental professionals affordable and easily available disinfectant.

Moreover, this study will provide protection not only to the dentist but also to their patients. Furthermore, it will help the dental professional render quality dental treatment to their patients.

This study will also be significant to dental associations in promoting infection control.

Lastly, the researcher will gain new knowledge in the use of hot pepper as a naturally produced disinfectant. And if proven effective, the researcher will be acknowledged.

### **Scope and Delimitations of the Study**

This is an experimental research which dealt in determining the effectiveness of hot pepper (*Capsicum annuum*) extract as alternative disinfectant for cuspidor. The experiment is only limited to antimicrobial assay of hot pepper. For the antimicrobial test, the researcher used pour plate method, using blood agar and Saboraud media. It also included culturing of target microorganism (bacteria and fungi) to test the reaction against the hot pepper disinfectant.

The results from the laboratory regarding the colony count were compared to know which concentration of hot pepper disinfectant, to eliminate most of the microorganisms found in the cuspidor. The researcher used Lysol as the positive control, and distilled water as the negative control, for the comparison of the effectiveness of disinfectants.

### **Definition of Terms**

The following terms are used in the study. It can help in further understanding of the reader.

**Alternative.** This is the choice limited to one of two or more possibilities, as of things, propositions, or courses of action, the selection of which precludes any other possibility.<sup>11</sup>

**Bacteria.** They are ubiquitous one-celled organisms, spherical, spiral, or rod-shaped and appearing singly or in chains.<sup>12</sup>

**Capsicum Annuum.** This refers to the scientific name of red pepper.<sup>13</sup>

**Colony Count.** It means the enumeration of direct count of viable, isolated bacterial, archael, or fungal Cells or Spores capable of growth on solid culture media.<sup>14</sup>

**Concentration.** It is defined as the amount of a specified substance in a unit amount of another substance. Concentration usually is expressed in terms of mass per unit volume.<sup>15</sup>

**Cuspidor.** This refers to a fixture provided on some dental operating units into which patients can expectorate. In current practice, most operating fields are kept clear of saliva by high volume suction saliva ejectors.<sup>16</sup>

**Disinfectant.** This is a chemical that destroys vegetative forms of harmful microorganisms (as bacteria and fungi) especially on inanimate objects but that may be less effective in destroying spores.<sup>17</sup>

**Effectiveness.** It means the degree to which objectives are achieved and the capacity to produce strong physiological or chemical effects.<sup>18</sup>

**Extract.** This means a concentrate obtained by treating a crude material, such as plant, with a solvent, evaporating part or all of solvent from the resulting solution, and standardizing the resulting product.<sup>19</sup>

**Fungi.** It is a taxonomic kingdom, or in some classification schemes a division of the kingdom Plantae, comprising all the fungus groups and sometimes also the slime molds.<sup>20</sup>